

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Cunningham et al.
Serial No.: 09/543,612
Filed: April 5, 2000
For: APPARATUS AND METHOD
FOR MEASURING THE MASS
OF A SUBSTANCE

Confirm. No.: 6510
Group: 2856
Examiner: Chapman Jr., John E.
Docket No.: DR-308J

AFFIDAVIT UNDER 37 CFR SECTION 1.132

I, Charles E. Spangler, Jr., hereby say:

I am the Director of Operations at RJ Lee Group, Inc., which has been licensed by The Charles Stark Draper Laboratory, Inc. to use the technology described in the above-identified patent application. In particular, RJ Lee Group, Inc. licensed the technology because it provides the ability to measure Non-Volatile Residue (NVR) concentrations at the nanogram and the sub-nanogram levels and because the invention is able to provide results significantly faster than the prior art. RJ Lee Group, Inc. now manufactures the Nanoscale 9100™ device, a brochure of which is attached hereto, which embodies the subject invention.

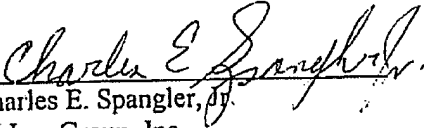
After RJ Lee Group, Inc. began manufacturing the Nanoscale 9100™, it won the Clean Technology Award of 2002, a copy of which is attached hereto. This award clearly shows that the subject invention is not only novel, but innovative as well.

Since RJ Lee Group, Inc. began manufacturing the Nanoscale 9100™ there has been a strong market demand for this product. Twenty-three different companies have made separate inquiries about purchasing the Nanoscale 9100™ thereby demonstrating a need for a product of this type. Among the well known companies that have inquired about purchasing the Nanoscale 9100™ are Kennedy Space Center, Stennis Space Center, Boeing, Boeing Commercial Aircraft, Rocketdyne, Crane Division of the Naval Surface Warfare Center, Los Alamos National Laboratory, Procter & Gamble, Lawrence Livermore National Laboratory, Eli Lilly and Company, and Pfizer. Many of these companies have independently contacted RJ Lee Group, Inc. about the Nanoscale 9100™ after hearing about the product.

Prior art devices could perform NVR measurements, but these devices take several hours to complete a measurement that the Nanoscale 9100™ can perform in minutes. To my knowledge, there is not another comparable device on the current market that offers the advantages of the Nanoscale 9100™.

RJ Lee Group, Inc. has agreed to pay a substantial license fee for the subject invention which includes paying a royalty for each individual sale of the product associated with the subject invention.

The undersigned, being hereby warned that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 USC 1001, and that such willful false statements may jeopardize the validity of the application or any resulting registration, declare that the facts set forth in this declaration are true; all statements made of his own knowledge are true; and all statements made on information and belief are believed to be true.


Charles E. Spangler, Jr.
RJ Lee Group, Inc.

12-27-2004
Date

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CleanTech™

For Cleaning Process Improvement

Charlie Simpson
Editor
CleanTech magazine
84 Park Avenue
Flemington, NJ 08822
April 30, 2002

Robert J. Lee
President
RJ Lee Group
350 Hochberg Road
Monroeville, PA 15146

Mr. Lee,

The Cleaning Technology Awards recognize technology innovations equally across both the industrial and precision cleaning markets. From the numerous nominations submitted for the 2002 Awards, CleanTech's staff selected 15 qualifying candidates. CleanTech's editors invited our readers to help us decide this year's most pioneering technologies, by submitting ballots featured in the magazine.


It is my pleasure to inform you that RJ Lee Group's NanoScale 9100 is a winner of CleanTech magazine's third annual Cleaning Technology Awards.

Ranging from outsourced services and alternative chemistries to treatment hardware and complete wash systems, this year's nominations exemplified how the cleaning industry remains diverse and growing.

These products help to improve production, eliminate bottlenecks, comply with regulatory mandates, reduce costs, increase safety, and of course, improve the cleanliness process – all critical issues for any manufacturer.

From those, the NanoScale 9100 was chosen as an outstanding technology that the CleanTech staff believes offers revolutionary benefits to our readers.

The 2002 Cleaning technology trophies will be presented at the Awards Breakfast at the CleanTech 2002 Conference and Expo being held in Atlanta's Cobb Galleria Centre, May 21 – 23, 2002 at our Awards Breakfast on Wednesday May 22, at 8:00 am. I invite you and your staff to attend this year's ceremony. Congratulations, and I look forward to seeing you at the awards presentation in Atlanta.


Charlie Simpson
Editor



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Analyze Non-Volatile Residues with nanogram sensitivity from only 10 microliters of sample in just minutes... anywhere!

The NanoScale 9100 is a novel system for detecting and quantifying Non-volatile residue (NVR) concentrations in liquids using a micro-mechanical flexural plate wave (FPW) gravimetric sensor.

It can also be used to measure any small, uniformly deposited film for micro-liter syringe calibration, solution concentration measurements, aerosol distribution, etc. There is a growing need to measure the purity level of many chemicals both during their manufacture and use. In particular, the level of non-volatile contaminants are generally of interest in high-purity solvents because they will remain as residual contaminants after the solvent has been used in a cleaning process.

back sample

For typical solvents, the NVR to be measured will be on the order of 0.1 to 100 ppm in concentration and requires the evaporation of large quantities of the solvent. Tight environmental control of the measurement area, and lengthy procedures to ensure the needed accuracy. Quantification of NVR concentration is critical for many processes in precision cleaning, semiconductor manufacturing, medical device and high-purity chemical analysis. NVR quantification testing is becoming an quality assurance programs for externally supplied materials used in critical applications.

The NanoScale 9100 is a simple, fast and inexpensive method for measuring NVR concentrations in any liquid sample using a minimal sample volume. With its built-in heater the gravimetric sensor is continuously temperature stabilized and the entire system is self-contained.

The NanoScale 9100 features a user-friendly touch-screen control system.

NanoScale 9100

NanoScale 9100 - The Lab On A Chip

- Only 10 microliters of sample fluid required
- NVR measurement in as little as 5 minutes
- Nanogram sensitivity (i.e. <1ppm NVR)
- Continuously temperature stabilized
- Rugged - does not require enclosure or vibration isolation
- Direct readout in mass (nanograms) or concentration (ppm/vol)
- Small footprint by using MEMS technology
- Reduces total laboratory emissions

NanoScale 9100

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Applications

The NanoScale 9100 can be used for a variety of weighing applications where ultra-high sensitivity, speed and simplicity are desired including:

- Measurement of Non-Volatile Residues (NVR) in solvents
- Cleanliness analysis of water discharged from semiconductor wafer processing
- Incoming inspection of high purity reagents and solvents.
- Quality control in production of high purity chemicals
- Monitoring of fine aerosols in painting and coating operations
- Measurement of non-volatile precipitates in high purity water for cleaning and processing
- Monitoring of fine particulate in ambient air and fluids
- Measuring active ingredients in a volatile carrier (pharmaceuticals)

Disadvantages of Current NVR Measurement Techniques

Standard laboratory practice is to boil a large quantity (up to a liter) of solvent sample until the entire sample is evaporated. Any material remaining after boiling is nonvolatile residue (NVR). A microbalance is used to measure the weight of any material remaining after boiling. A large quantity of solvent must be boiled away in order to provide enough mass gain to be resolved by the microbalance. Typically, NVR concentrations of interest are in the 0.1-100 ppm range.

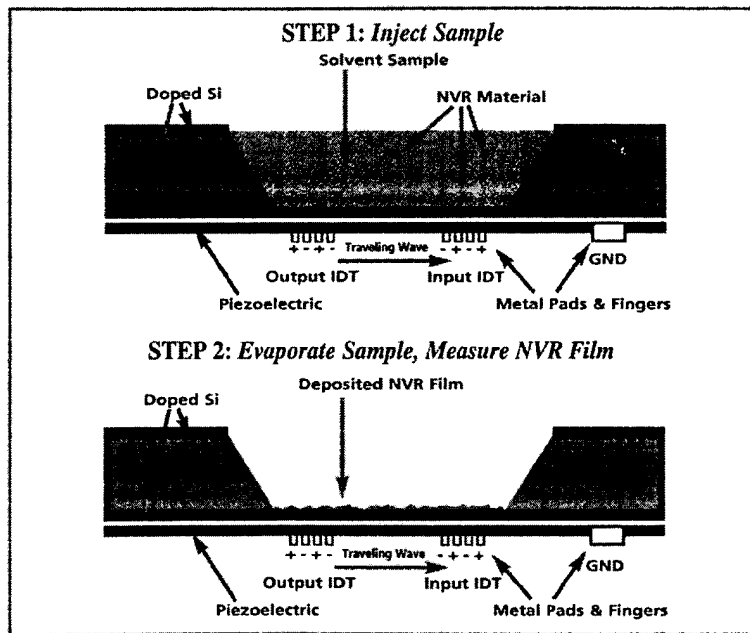
Disadvantages of this method include: high volumes of solvent are consumed; the boiling and measuring operations take several hours; boiled solvent is exhausted into the atmosphere; measurement process is labor intensive; reproducibility problems arise due to the ease of contamination during long sample exposure times.

NanoScale 9100 - Unique Sensor Technology

The FPW sensor operates as a mass detection device by registering a decrease in the resonant frequency of a thin silicon membrane when mass is deposited on its surface. Because the resonant frequency shift is proportional to the amount of deposited mass, the sensor can be used to quantify the amount of material on the surface. The accuracy is determined by the sensors inherent sensitivity and by the frequency resolution of the electronic circuit used to drive the resonant mode.



Automated Analysis Mode



Schematic View of Sensor

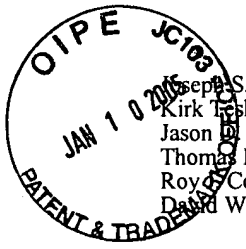
Specifications

- Mass Range - 10 nanograms to 1 microgram
- Sample size - typically 10 microliters
- Heater - continuously controllable up to 100 degrees C with 1 degree precision
- Weight sensitivity of FPW - 150Hz/nanogram
- Resolution - <10 nanogram (e.g. <1.0 ppm NVR)
- Output - via serial interface

Suggested Retail Price: \$16,500 Domestic, \$18,000 International

RJ Lee **microsystems**
LLC

350 Hochberg Road, Monroeville, PA 15146 ■ Phone: 866-257-7400 ■ Fax: 724-733-1799
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January 7, 2005

Mail Stop Amendment
Commissioner for Patents
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SUBJECT: Applicants: Cunningham et al.
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Dear Sir:

Enclosed is a PRELIMINARY AMENDMENT in connection with the applicant's Request for Continued Examination, filed December 17, 2004. Also enclosed is an Affidavit under 37 CFR §1.312, with an attached brochure for a product embodying the invention disclosed in the subject patent application.

If for any reason this Preliminary Amendment is found to be INCOMPLETE, or if at any time it appears that a TELEPHONE CONFERENCE with counsel would help advance prosecution, please telephone the undersigned or his associates, collect in Waltham, Massachusetts, at (781) 890-5678.

If any payment during prosecution is found to be incorrect, please charge any deficiency or credit any overpayment to my Deposit Account No. 09-0002. A copy of this letter is enclosed for use by the Finance Branch in the event that it is necessary to make any charge or credit to my deposit account.

In addition, pursuant to Rule 1.136(a)(3), the Office is hereby authorized to treat any future reply requiring an extension of time as incorporating a request therefor. Also, any request or Petition for an Extension of Time notwithstanding an inadvertent reference in the Petition to a shorter period of time is to be treated as requesting the appropriate length of time.

Kindly acknowledge receipt of the foregoing by returning the enclosed self-addressed postcard.

Sincerely,

David W. Poirier
Reg. No. 43,007

DWP:wj
Enclosures

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the U.S. Postal Service with sufficient postage via first class mail in an envelope addressed to Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on January 7, 2005.

Wynne D. Janis